

Claims:

- 1 1. A solid catadioptric lens having a single viewpoint on an
2 optical axis and comprising:
 - 3 a) a spherical refractive surface having a center C on
4 said optical axis;
 - 5 b) an ellipsoidal reflective surface facing said
6 spherical refractive surface and having a first focus
7 F_1 coincident with said center C, whereby said center
8 C is said single viewpoint; and
 - 9 c) a shaping surface facing said ellipsoidal reflective
10 surface for shaping a light passing said single
11 viewpoint.
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1 2. The solid catadioptric lens of claim 1, wherein said
2 shaping surface is a refractive shaping surface and
3 said solid catadioptric lens further comprises an
4 aperture for enforcing said single viewpoint.
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- 1 3. The solid catadioptric lens of claim 2, wherein
2 said aperture is positioned at a second focus F_2
3 of said ellipsoidal reflective surface.
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- 1 4. The solid catadioptric lens of claim 3,
2 wherein said second focus F_2 is on said
3 optical axis and substantially at said
4 refractive shaping surface.
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- 1 5. The solid catadioptric lens of claim 3,
2 wherein said second focus F_2 is on said

3 optical axis and inside said solid
4 catadioptric lens.
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1 6. The solid catadioptric lens of claim 2, wherein
2 said refractive shaping surface is an ellipsoidal
3 refractive shaping surface.
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1 7. The solid catadioptric lens of claim 6,
2 wherein said ellipsoidal refractive shaping
3 surface has a first focus F_1' coincident with
4 said second focus F_2 .
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1 8. The solid catadioptric lens of claim 7,
2 wherein said ellipsoidal refractive shaping
3 surface has a conic constant K_2 equal to a
4 conic constant K_1 of said ellipsoidal
5 reflective surface.
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1 9. The solid catadioptric lens of claim 1, wherein said
2 shaping surface is a reflective shaping surface and
3 said solid catadioptric lens further comprises an
4 aperture for enforcing said single viewpoint.
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1 10. The solid catadioptric lens of claim 9, wherein
2 said aperture is positioned at said ellipsoidal
3 reflective surface.
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- 1 11. The solid catadioptric lens of claim 9, wherein
2 said aperture is positioned beyond said
3 ellipsoidal reflective surface.
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- 1 12. The solid catadioptric lens of claim 9, wherein
2 said reflective shaping surface is a second
3 ellipsoidal reflective shaping surface.
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- 1 13. The solid catadioptric lens of claim 12,
2 wherein said second ellipsoidal reflective
3 shaping surface has a first focus F_1'
4 coincident with said second focus F_2 .
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- 1 14. The solid catadioptric lens of claim 12,
2 wherein said second ellipsoidal reflective
3 shaping surface has a conic constant K_2 equal
4 to a conic constant K_1 of said ellipsoidal
5 reflective surface.
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- 1 15. The solid catadioptric lens of claim 1 comprising an
2 optical material having an index n .
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- 1 16. The solid catadioptric lens of claim 1, wherein said
2 shaping surface is a semi-transparent shaping surface.
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- 1 17. The solid catadioptric lens of claim 1, wherein said
2 shaping surface is selected from the group consisting
3 of a flat shaping surface, an ellipsoidal shaping
4 surface and a paraboloid shaping surface.

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1 18. A single viewpoint vision system comprising:

2 a) a solid catadioptric lens having an optical axis;

3 b) a spherical refractive surface having a center C on
4 said optical axis;

5 c) an ellipsoidal reflective surface facing said
6 spherical refractive surface and having a first focus
7 F_1 coincident with said center C, whereby said center
8 C is said single viewpoint; and

9 d) a shaping surface facing said ellipsoidal reflective
10 surface for shaping a light passing said single
11 viewpoint.

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1 19. The single viewpoint vision system of claim 18,
2 further comprising an optical relay for passing said
3 light.

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1 20. The single viewpoint vision system of claim 18,
2 wherein said shaping surface is selected from the
3 group consisting of reflective shaping surface,
4 refractive shaping surface and semi-transparent
5 shaping surface.

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1 21. The single viewpoint vision system of claim 18,
2 wherein said shaping surface is selected from the
3 group consisting of a flat shaping surface, an
4 ellipsoidal shaping surface and a paraboloid shaping
5 surface.

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1 22. The single viewpoint vision system of claim 18,
2 further comprising an element selected from the group
3 consisting of scanning arrangement, imaging element
4 and a display unit.
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